# NOTICE

**All drawings located at the end of the document.**

REF: 03-RF-00701; JLB-035-03

# ENVIRONMENTAL RESTORATION
# RFCA STANDARD OPERATING PROTOCOL
# FOR ROUTINE SOIL REMEDIATION
# FY03 NOTIFICATION #03-07
# IHSS GROUP 900-11
# IHSS 155 –903 INNER LIP AREA

**June 2003**





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## ACRONYMS AND ABBREVATIONS

| | |
|---|---|
| 903 Pad | 903 Drum Storage Area |
| AL | action level |
| bgs | below ground surface |
| BMP | best management practice |
| BZ | Buffer Zone |
| BZSAP | Buffer Zone Sampling and Analysis Plan |
| CDPHE | Colorado Department of Public Health and Environment |
| cpm | counts per minute |
| COC | contaminant of concern |
| cy | cubic yard |
| D&D | Decontamination and Decommissioning |
| ER | Environmental Restoration |
| ER RSOP | Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation |
| FY | Fiscal Year |
| HPGe | high-purity germanium |
| IHSS | Individual Hazardous Substance Site |
| IM/IRA | Interim Measure/Interim Remedial Action |
| IMP | Integrated Monitoring Program |
| K-H | Kaiser-Hill Company, L.L.C. |
| µg/kg | micrograms per kilogram |
| NA | not available |
| PAC | Potential Area of Concern |
| pCi/g | picocuries per gram |
| pCi/L | picocuries per liter |
| PCOC | potential contaminant of concern |
| POC | Point of Compliance |
| POE | Point of Evaluation |
| RCRA | Resource Conservation and Recovery Act |
| RFCA | Rocky Flats Cleanup Agreement |
| RFETS | Rocky Flats Environmental Technology Site |
| RSOP | RFCA Standard Operating Protocol |
| SID | South Interceptor Ditch |
| SOR | sum of ratios |
| VOC | volatile organic compound |
| WRW | Wildlife Refuge Worker |

# 1.0 INTRODUCTION

This Environmental Restoration (ER) Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) (DOE 2002a) Fiscal Year (FY) 03 Notification includes the scope of work to remediate Individual Hazardous Substance Sites (IHSSs) in the Rocky Flats Environmental Technology Site (RFETS) Buffer Zone (BZ). Activities specified in the ER RSOP are not reiterated here; however, deviations from the ER RSOP are included when appropriate.

The purpose of this notification is to invoke the ER RSOP for surface and near-surface soil with radionuclide contamination within a portion of BZ IHSS Group 900-11 IHSS 155, 903 Lip Area. Only that portion within the former inner perimeter fence of IHSS 155 (903 Inner Lip Area) will be addressed under this action. It should be noted that the 903 Inner Lip Area boundary (Figure 1) includes areas outside of IHSS 155 as defined by Hazardous Release Report (DOE 2002b). The 903 Inner Lip Area boundary was selected to include all locations where existing analytical data for surface or subsurface soil indicated a plutonium-239/240 exceedance of 50 picocuries per gram (pCi/g) or the sum of ratios (SOR) of RFCA-regulated radionuclides exceeded unity (1.0). Sampling location CW40-003, which was sampled as part of IHSS Group NE/NW, is also part of this notification. The remainder of contamination associated with IHSS 155 will be addressed in a future Interim Measure/Interim Remedial Action (IM/IRA).

# 2.0 IHSS GROUP 900-11

IHSS Group 900-11 sites are located in the RFETS BZ and include IHSS 112 – 903 Drum Storage Area, IHSS 140 – Hazardous Disposal Area, IHSS 155 – 903 Lip Area, and Potential Area of Concern (PAC) SE-1602 – East Firing Range. These locations are shown on Figure 1.

## 2.1 Project Conditions

The following conditions are present at this site:

- The 903 Inner Lip Area measures 11.8 acres in size (Figure 1) (excludes the 903 Pad area).
- A layer of artificial fill (approximately 4 inches of base coarse gravel) was placed on surface soil in the 903 Lip Area in 1970 (Figure 2).
- Imported topsoil was placed in areas remediated in 1976, 1978, and 1984 in the 903 Lip Area (Figure 2).
- Radionuclides are present in the surface and shallow subsurface soil.

The 903 Inner Lip Area is further subdivided into two distinct areas; the Pediment and the Colluvium areas (Figure 3) for discussion purposes. These two areas are separated by a fence running northeast-southwest near the topographic break south and east of the 903 Pad.

903 Lip Area – Pediment

The 903 Lip Area – Pediment is characterized by a relatively unbroken topographic slope formed on the Rocky Flats Alluvium. The 903 Lip – Pediment is bound on the north by the East Access Road and the south by the break in topography which forms Woman Creek's southward sloping hillside. The 903 Drum Storage Area is located on the pediment surface and is surrounded by the 903 Lip Area – Pediment.

The pediment area has undergone previous remedial activities and surface soil stabilization activities. In 1970, "slightly-contaminated" native soil adjacent to the 903 Drum Storage Area was relocated to the 903 Drum Storage Area and covered with a 3.4-acre asphalt pad (creating the 903 Pad). Covering with 4 inches of road base materials (Figure 2) stabilized the remaining contaminated soil on the pediment surface.

In 1984, soil was removed from one to two feet in depth parallel and adjacent to the former inner perimeter fence. Soil was removed 8 to 10 feet either side of the fence line from the former East Gate to 30 or 40 feet south of air sampler S-9, the southernmost air sampler (Figure 2).

903 Lip Area- Colluvium

The 903 Lip Area–Colluvium is located on Woman Creek's southward sloping hillside. IHSS 140 – Hazardous Disposal Area is a 1.5-acre IHSS collocated within the 903 Lip Area – Colluvium area. The site was used for the destruction and disposal of reactive metals and other chemicals. Metallic lithium was destroyed on the ground in the 1950s and 1960s. The activity was described in 1967 as lithium waste being disposed in a trench, moistened, and then covered with fill at the southeastern corner of the site. After the reaction, the residues were buried. Unknown quantities of other reactive metals (sodium, calcium, and magnesium) and some solvents were also destroyed at this location. Radionuclide contamination within IHSS 140 will be addressed under this action. It is anticipated that other contamination within IHSS 140 will be removed along with the removal of the radionuclide-contaminated soil.

There have been two previous remedial actions conducted within the 903 Lip Area – Colluvium. In 1976 approximately 4,000 cubic feet of soil were removed from within the 903 Lip Area southeast of Building 952. In 1978 approximately 43,000 square feet of soil that exceeded 2,000 counts per minute (cpm) was removed to a depth of approximately 1.4 inches (approximately 186 cubic yards [cy]) (Figure 2).

## 2.2 Contaminants of Concern

Contaminants of concern (COCs) at IHSS 155 were determined based on data collected during previous studies (DOE 1992-2001, DOE 2000a, DOE 2001a). Radionuclides are present in the surface and near-surface soil at IHSS 155 – 903 Lip Area. Activity ranges for COCs in surface and subsurface soil are provided in Tables 1 and 2.

**Table 1**
**Surface Soil Characterization Summary**

| Radionuclide | Maximum Result (pCi/g) | Background Mean Plus Two Standard Deviations (pCi/g) | RFCA WRW AL (pCi/g) |
|---|---|---|---|
| Americium-241 | 3140 | 0.0227 | 76 |
| Plutonium-239/240 | 14950 | 0.066 | 50 |
| Uranium-233/234 | 35.8 | 2.253 | 300 |
| Uranium-235 | 1.023 | 0.0939 | 8 |
| Uranium-238 | 75.7 | 2 | 351 |

AL – action level
WRW – Wildlife refuge worker

**Table 2**
**Subsurface Soil Characterization Summary**

| Radionuclide | Maximum Result (pCi/g) | Background Mean Plus Two Standard Deviations (pCi/g) | RFCA WRW AL (pCi/g) |
|---|---|---|---|
| Americium-241 | 406 | 0.02 | 76 |
| Plutonium-239/240 | 1820 | 0.02 | 50 |
| Uranium-233/234 | 170.4 | 2.64 | 300 |
| Uranium-235 | 8.623 | 0.12 | 8 |
| Uranium-238 | 288.4 | 1.49 | 351 |

Figures 4 and 5 present existing surface and subsurface radionuclide analytical results above background mean plus two standard deviations for existing surface soil (soil from ground surface to 6 inches below ground surface [bgs]) and subsurface soil (soil greater than 6 inches bgs).

Figures 5 and 6 present existing surface and subsurface radionuclide analytical results for soil with plutonium-239/240 activities greater than 50 pCi/g.

Figures 7 and 8 present the RFCA radionuclide SORs for surface and subsurface soil (DOE 2000a). The SOR is calculated for radionuclides detected at activities greater than background activities. The SOR is the sum of the ratios of the result to the AL as described by the following equation:

$$SOR_{rads} = x_{Am-241}/y_{Am-241} + x_{Pu-239/240}/y_{Pu-239/240} + x_{U-233/234}/y_{U-233/234} + x_{U-235}/y_{U-235} + x_{U-238}/y_{U-238} \quad \text{(Equation 1)}$$

Where:

x = concentration/activity in soil

y = AL.

In accordance with the RFCA Modification (DOE et al. 2003), the SOR calculation uses the AL of 116 pCi/g for plutonium-239/240 although the cleanup goal remains 50 pCi/g.

## 2.3 Subsurface Soil Risk Screen

**Screen 1 – Are COC Concentrations Below Table 3 WRW Soil ALs?**

No. Figure 7 presents 12 subsurface soil locations where plutonium-239/240 exceeds the 50 pCi/g AL.

**Screen 2 – Is there a potential for subsurface soil to become surface soil (landslide and erosion areas identified on [RFCA Attachment 5] Figure 1)?**

Yes. Figure 1 of the RFCA Attachment 5, Modification presents areas of landslides and high erosion within the 903 Inner Lip Area boundary. These areas of landslides and high erosion potential are located within the Colluvial area where both surface and subsurface soil plutonium-239/240 activity exceeds 50 pCi/g.

**Screen 3 – Does subsurface soil radiological contamination exceed criteria in Section Section 5.3 and Attachment 14?**

As shown on Figure 7, plutonium-239/240 activities are less than 3 nanocuries per gram.

**Screen 4 – Is there an environmental pathway and sufficient quantity of COCs that would cause an exceedance of surface water standards?**

Yes. This site is in an area prone to erosion and landslides as shown on Figure 1 of the RFCA Attachment 5 Modification (DOE et al. 2003).

**Screen 5 – Are COC concentrations below the Table 3 Soil ALs for ecological receptors?**

Yes. All COC concentrations are less than the Table 3 ALs for ecological receptors.

## 2.4 Remediation Plan

Soil with contaminant concentrations greater than WRW ALs, or as indicated by the Subsurface Soil Risk Screen, will be removed in accordance with RFCA and the ER RSOP (DOE 2002a).

The existing sampling data (Figures 4 through 9) indicate that radionuclide contamination is located within the top 6 inches of soil (surface soil). Results at 141 of the 235 surface sampling locations indicate that plutonium-239/240 activity is greater than 50 pCi/g. Only 15 of the 68 subsurface soil sampling locations resulted in plutonium-239/240 activities greater than 50 pCi/g.

Soil remediation will be conducted by initially removing the top 6 inches of soil and/or fill materials in the area exceeding 50 pC/g of plutonium, as shown on Figure 6. Isolated areas will be excavated individually. This should result in removal of most of the 4 inches of road base in the pediment area and imported soil from remediated areas in the Colluvium area. The upper six inches of soil with radionuclide activity that exceeds the WRW AL will be removed. Samples will be collected in the areas where radionuclide activities are greater than WRW ALs based on a composite sampling protocol. These

samples will be analyzed using field instruments (gamma analysis) to determine the americum-241 activity. The americum-241 activity will be used to estimate the plutonium-239/240 activity, which will be compared to the 50 pCi/g accelerated action decision threshold. If subsurface soil is found to exceed 50 pCi/g, a six-inch layer of soil will be removed and packaged for offsite disposal.

This process will continue until *in situ* HPGe measurements and confirmation sample results indicate plutonium-239/240 activities below 50 pCi/g and a SOR of less than unity (1.0) or until a depth of 3 feet bgs is reached. Once radionuclide activities in soil are determined to be below 50 pCi/g (plutonium-239/240) and an SOR less than unity, the area may be backfilled. Soil remediation will be conducted in the open air. Remediation conducted in the open air shall meet rigorous dust suppression and radiological work requirements. *In situ* high-purity germanium (HPGe) measurements may also be used to determine radionuclide activities in soil for confirmation sampling or to determine if additional remediation is required.

The proposed action for IHSS 155 – 903 Inner Lip Area includes the following:

- Remove the top 6 inches of fill/native soil within the 903 Inner Lip Area (approximately 13.06 acres and 6,200cy) and additional soil, as necessary, to remove all soil with contaminant concentrations greater than RFCA ALs or to a depth of 3 feet bgs (3,700 cy).

- Collect confirmation samples in accordance with the Buffer Zone Sampling and Analysis Plan (BZSAP [DOE 2002c]) (Section 4.5). Confirmation sampling will be conducted using laboratory gamma spectroscopy. The americium-241 to plutonium-239/240 conversion factor of 5.7 will be used to calculate plutonium 239/240 activity. If HPGe equipment is used, the americium-241 to plutonium-239/240 conversion factor of 8.08 will be used.

- Backfill, as needed, with clean soil, regrade, and revegetate as appropriate.

## 2.5 Stewardship Evaluation

Based on the COCs (Section 2.2) and the ER RSOP (DOE 2002a), it is anticipated that all contamination above WRW ALs will be remediated. The potential remediation area is shown on Figure 9. Additional remediation to below WRW ALs is not required by RFCA, but will be evaluated using the consultative process. A map of residual contamination will be generated after remediation. The following sections contain the stewardship evaluation

### 2.5.1 Proximity to Other Group 900-11 Contaminant Areas

Nearby/collocated potential contaminant areas include IHSS 112 – 903 Drum Storage Area (currently undergoing remediation) and IHSS 140 – Hazardous Disposal Area. These sites, potential contaminants of concern (PCOCs), media of interest, proximity, and relationships to IHSS 155 – 903 Inner Lip Area are listed in Table 3 and shown on Figure 1. Radionuclide-contaminated surface soils within IHSS - 140, Hazardous Disposal Area will be remediated during this action.

**Table 3**
**Other Potential Contaminant Sources for IHSS Group 900-11**

| IHSS Group/IHSS | PCOCs/COCs | Media | Distance from IHSS Group 900-11, IHSS 155 – 903 Lip Area |
|---|---|---|---|
| 903 Drum Storage Area | Radionuclides<br>VOCs | Subsurface Soil | 903 Lip Area surrounds the 903 Drum Storage Area |
| 900-11, IHSS 140 – Hazardous Disposal Area | Radionuclides<br>Metals<br>VOCs | Surface Soil<br>Subsurface Soil | Collocated within IHSS 155 |

### 2.5.2 Surface Water Protection

Surface water protection includes the following considerations:

*Is there a pathway to surface water from potential erosion to streams or drainages?*

Surface water runoff from the western end of the 903 Lip Area flows north and then west into the ditch south of Central Avenue where it is sampled at location GS39 (Figure10). From GS39, surface flow is to the north to the South Walnut Creek Drainage. It is unlikely that contaminants from the 903 Lip Area will be distinguishable from other sources. Station GS39 also receives runoff from the area west of the 903 Lip Area including the 904 Pad. Runoff from the northeastern region of the 903 Pad flows east into a small ditch and eventually to a borrow ditch bordering the BZ road, east of the 903 Lip Area. Flow from the borrow ditch is routed through a culvert leading to surface water performance monitoring location SW055. Surface water flows from SW055 toward the South Interceptor Ditch (SID). Station SW055 receives runoff from the 903 Pad and Lip Areas. Surface water runoff from the 903 Lip Area is monitored under the Project Plan for Surface Performance Monitoring of the 903 Drum Storage Area (IHSS 112) and Lip Area (IHSS 155) to Establish Baseline Surface Water Quality (K-H 2001).

There are no points of evaluation (POEs) or points of compliance (POCs) in the immediate vicinity of IHSS 155 – 903 Lip Area. The closest surface water monitoring stations are GS39 and SW055. Monitoring data from GS39 and SW055 (DOE 2002d) are summarized in Table 4. Additional surface water monitoring stations designed to monitor surface water quality in the sub-basins draining the 903 Lip Area were installed through the Integrated Monitoring Program (IMP). New surface water stations include GS51, GS52, GS53, and GS54 (K-H 2001). However, only GS52 provided enough flow from July to September to collect a sample for the analysis (DOE 2002d).

**Table 4**
**Surface Water Analytical Results**

| Analyte | Maximum Result (pCi/L) | Woman Creek ALs and Standards (pCi/L) | Walnut Creek ALs and Standards (pCi/L) |
|---|---|---|---|
| **GS39 (8/6/02 – 10/2/02)** | | | |
| Americium-241 | 0.022 | NA | 0.15 |
| Plutonium-239/240 | 0.014 | NA | 0.15 |
| Uranium (Total) | 0.127 | NA | 10 |
| **SW052 (5/24/02 – Sample waiting to trigger on next flow)** | | | |
| Americium-241 | 0.065 | 0.15 | NA |
| Plutonium-239/240 | 0.37 | 0.15 | NA |
| Uranium (Total) | 2.860 | 11 | NA |
| **SW055 (6/20/02 – 10/2/02)** | | | |
| Americium-241 | 0.013 | 0.15 | NA |
| Plutonium-239/240 | 0.052 | 0.15 | NA |
| Uranium (Total) | 9.448 | 11 | NA |

Source: Rocky Flats Environmental Technology Site Quarterly Environmental Monitoring Report July - September 2002 (DOE 2002d)
NA – not available
pCi/L – picocuries per liter

Results from the other 903 Lip Area surface water monitoring stations are not available because of drought conditions; there was no water to sample.

*Do characterization data indicate there are contaminants in surface soil?*

Tables 1 and 2 list surface and subsurface radionuclide data (DOE 2000a) from IHSS Group 900-11, IHSS 155 – 903 Lip Area, along with background values and RFCA ALs for comparison. As shown in Table 1, Surface Soil Characterization Summary, americium-241 and plutonium-239/240 activities in surface soil are greater than the WRW ALs. Table 2, Subsurface Soil Characterization Summary, shows americium-241, plutonium-239/240, and uranium-235 activities in subsurface soil are greater than the RFCA ALs.

*Is the IHSS Group in an area with high erosion potential, based on the Figure 1 of RFCA Attachment 5?*

Yes. Figure 1 of the RFCA Attachment 5, Proposed Modification presents areas of landslides and high erosion within the 903 Inner Lip Area boundary. These areas of landslides and high erosion potential are located within the Colluvial area where both surface and subsurface soil plutonium-239/240 activity exceed 50 pCi/g.

### 2.5.3 Monitoring

Groundwater monitoring is being conducted in accordance with the Performance Monitoring for 903 Pad/Lip Remediation (K-H 2002a) Monitoring includes the following considerations relating to radionuclides.

*Do monitoring results from POEs or POCs indicate there are groundwater impacts from the area under consideration?*

Groundwater monitoring results from wells in the 903 Pad area (DOE 1995) indicate that americium-241, plutonium-239/240, uranium-235, and uranium-238 activities are greater than RFCA Tier II groundwater ALs, and americium-241 activities are greater than the RFCA Tier I groundwater AL. Table 5 list the maximum results from IHSS 155 – 903 Lip Area performance monitoring wells that exceeded RFCA Tier II groundwater ALs.

**Table 5**
**Groundwater Exceedances Associated With IHSS Group 900-11, IHSS 155 – 903 Lip Area**

| Location | Analyte | Maximum Result (pCi/L) | Tier I AL (pCi/L) | Tier II AL (pCi/L) |
|---|---|---|---|---|
| 00191 | Plutonium-239/240 | 1.3 | 15.1 | 0.151 |
| 00191 | Uranium-233,-234 | 2.46 | 106.0 | 1.06 |
| 00191 | Uranium-238 | 1.6 | 76.8 | 0.768 |
| 07291 | Uranium-233,-234 | 5.7 | 106.0 | 1.06 |
| 07291 | Uranium-238 | 4.7 | 76.8 | 0.768 |
| 4386 | Plutonium-239/240 | 0.23 | 15.1 | 0.151 |
| 4386 | Strontium-89,90 | 2.4 | 85.2 | 0.852 |
| 4386 | Uranium-233,-234 | 9.858 | 106.0 | 1.06 |
| 4386 | Uranium-238 | 7.629 | 76.8 | 0.768 |
| 50099 | Americium-241 | 1.72 | 14.5 | 0.145 |
| 50099 | Plutonium-239/240 | 0.175 | 15.1 | 0.151 |
| 50099 | Uranium-233,-234 | 1.27 | 106.0 | 1.06 |
| 90402 (Dry) | NA | NA | NA | NA |
| 90502 (Dry) | NA | NA | NA | NA |

Groundwater quality in this area may have been impacted by radionuclide contamination from IHSS 155 – 903 Lip Area.

*Can the impact be traced to a specific IHSS Group?*

Radionuclides in groundwater monitoring wells in IHSS 155 – 903 Lip Area are similar to constituents detected above background means plus two standard deviations in subsurface soil near these sites.

*Are additional monitoring stations needed?*

Not at this time. Wells 1587, 1687, 06591, 06891, 06991, 07191, 13091, 13191, 13291, and 50199 in the 903 Pad Lip Area were abandoned in support of the future remediation of the area. Two new wells, 90402 and 90502, were added to monitor remediation activities. Currently Wells 00191, 07291, 4386, 50099, 90402, and 90502 make up the groundwater monitoring network for the 903 Lip Area remediation. Their locations are also shown on Figure 10. These wells will also be evaluated after remediation to determine whether they will be needed for long-term monitoring.

*Can existing monitoring locations be deleted if additional remediation is conducted?*

Current monitoring stations may be needed to detect volatile organic compound (VOC) concentrations in groundwater.

### 2.5.4 Stewardship Actions and Recommendations

The stewardship actions and recommendations for IHSS 155 – 903 Inner Lip Area are as follows:

- Use best management practices (BMPs) (Section 7.2 of the ER RSOP [DOE 2002a]) to control runon to the remediation area and runoff to nearby surface water during remediation.

- Implement near-term institutional controls until final closure and stewardship decisions are implemented, including the following:
  - Signs and barriers;
  - Restrictions on soil remediation; and
  - Soil excavations controlled through the Site Soil Disturbance Permit process.

- Implement long-term stewardship actions, including the following:
  - Review of groundwater and surface water monitoring stations near IHSS Group 900-11 when long-term monitoring options are evaluated;
  - Federal ownership; and
  - Land use restrictions to prevent soil excavation. Specific land use restrictions will be discussed in the Site Long-Term Stewardship Plan.

These recommendations may change based on in-process remediation activities and other future RFETS remediation decisions.

## 2.6 Accelerated Action Remediation Goals

ER RSOP remedial action objectives include the following:

- Provide a remedy consistent with the RFETS goal of protection of human health and the environment;

- Provide a remedy that minimizes the need for long-term maintenance and institutional or engineering controls; and

- Minimize the spread of contaminants during implementation of accelerated actions.

The accelerated action remediation goals for IHSS 155 – 903 Lip Area include the following:

- Remove 6 inches of surface soil/road base fill within the 13.06-acre 903 Inner Lip Area (volume approximately 6,200 cy *in situ)* and dispose as appropriate, pending waste characterization;

- Remove estimated 4 acres of radionuclide contaminated subsurface soil (soil with activities greater than RFCA ALs) in the 903 Lip Area (approximately 3,700 cy *in situ*);

- Evaluate remaining soil for additional removal through the consultative process using stewardship considerations; and

- Backfill with clean soil, regrade, and revegetate.

## 2.7 Treatment

Not applicable.

## 2.8 Confirmation Sampling

Confirmation samples will be collected to determine whether accelerated action goals have been achieved. A statistical grid was determined based on Equation 4-3 provided in BZSAP Section 4.5.2, Sampling Locations. Using an area of 13 acres (excludes the 3.4-acre 903 Pad) and a size factor of 1,033 feet (east-west length of 903 Inner Lip Area) a 42-foot grid size was determined. Based on this grid size, confirmation samples will be collected and analyzed in the area with plutonium-239/240 activities exceeding 50 pCi/g as shown on Figure 7. A composite sample, consisting of five grab samples, will be used as the confirmation sample for each grid area. If the composite sample result exceeds 50 pCi/g, additional soil will be excavated until the composite confirmation sample result is less than 50 pCi/g based on onsite gamma spectroscopy.

## 2.9 Project-Specific Monitoring

Project-specific surface water and groundwater monitoring during remediation was planned through the yearly IMP process where additional monitoring is considered for Decontamination and Decommissioning (D&D) and remediation projects. Air monitoring will be conducted in accordance with the Performance Monitoring for Radionuclides: 903 Pad Remediation Project (IHSS 112 & 155) (K-H 2002b). The Colorado Department of Public Health and Environment (CDPHE) will also conduct additional project-specific air monitoring, which will be described in the FY03 IMP.

## 2.10 Units and Intended Waste Disposition

Not applicable.

## 2.11 Administrative Record Documents

DOE, 1992-2002, Historical Release Reports for the Rocky Flats Plant, Golden, Colorado.

DOE, 1995, Final Phase II RFI/RI Report for Operable Unit 2, 903 Pad, Mound and East Trenches Area, Rocky Flats Plant, Golden, Colorado, December.

DOE, 1999, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, April - June 1999, Golden, Colorado, August.

DOE, 1999, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, July - September 1999, Golden, Colorado, November.

DOE, 2000, Characterization Report for the 903 Drum Storage Area, 903 Lip Area, and Americium Zone, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2000, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, October - December 1999, Golden, Colorado, November.

DOE, 2000, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, January - March 2000, Golden, Colorado, May.

DOE, 2000, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, April - June 2000, Golden, Colorado, August.

DOE, 2000, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, July - September 2000, Golden, Colorado, November.

DOE, 2000, Report on Soil Erosion and Surface Water Sediment Transport Modeling for the Actinide Migration Evaluations at the Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2001, Draft Buffer Zone Data Summary Report, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2001, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, October - December 2000, Golden, Colorado, February.

DOE, 2001, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, January - March 2001, Golden, Colorado, May.

DOE, 2001, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, April - June 2001, Golden, Colorado, August.

DOE, 2001, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, July - September 2001, Golden, Colorado, November.

DOE, 2002, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, October - December 2001, Golden, Colorado, February.

DOE, 2002, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2002, Buffer Zone Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, CDPHE, and EPA, 1996, Rocky Flats Cleanup Agreement, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, CDPHE, EPA, Kaiser-Hill, and RMRS, 1999 Rocky Flats Cleanup Agreement, Appendix 3 RFCA Implementation Guidance Document, July.

Kaiser-Hill Company, L.L.C, 2001, Project Plan for Surface Water Performance Monitoring of the 903 Drum Storage Area (IHSS 112) and Lip Area (IHSS 155) to Establish Baseline Surface Water Quality, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

Kaiser-Hill Company, L.L.C., 2002b, Performance Monitoring for Radionuclides: 903 Pad Remediation Project (IHSSs 112 & 155), Rocky Flats Environmental Technology Site, Golden, Colorado, May.

### 2.12 Projected Schedule

Remediation of IHSS 155 Inner 903 Lip Area is scheduled to begin in FY04. It is anticipated that this project will take six months to complete.

### 2.13 Surface Soil Treatability Test

RFETS will perform a treatablity test on undisturbed surface soil in 903 Outer Lip Area (IHSS 155). The goal of the treatablity test will be to remove only the radionuclide-contaminated (fine-grained) portion of surface soil while leaving vegetation and remaining soil relatively undisturbed. It is anticipated that initially ten 10-meter by ten-meter test plots with increasing radionuclide activity will be required to determine effectiveness of the equipment. Additional test plots will be added to determine excavation rates and the area expanded further based on vacuum effectiveness. The test plots will be located within the 903 Outer Lip Area where plutonium-239/240 activities in surface soil exceed 50 pCi/g.

## 3.0 PUBLIC PARTICIPATION

This content of this Notification was discussed at several ER/D&D Status Meetings and will be specifically addressed at the August 2003 meeting. Copies of the Notification are available at the Rocky Flats Reading Rooms.

## 4.0 REFERENCES

DOE, 1992-2001, Historical Release Reports for the Rocky Flats Plant, Golden, Colorado.

DOE, 1995, Final Phase II RFI/RI Report for Operable Unit 2, 903 Pad, Mound and East Trenches Area, Rocky Flats Plant, Golden, Colorado, December.

DOE, 1999a, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, April - June 1999, Golden, Colorado, August.

DOE, 1999b, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, July - September 1999, Golden, Colorado, November.

DOE, 2000a, Characterization Report for the 903 Drum Storage Area, 903 Lip Area, and Americium Zone, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2000b, Rocky Flats Environmental Technology Site, Quarterly Environmental Monitoring Report, October - December 1999, Golden, Colorado, November.

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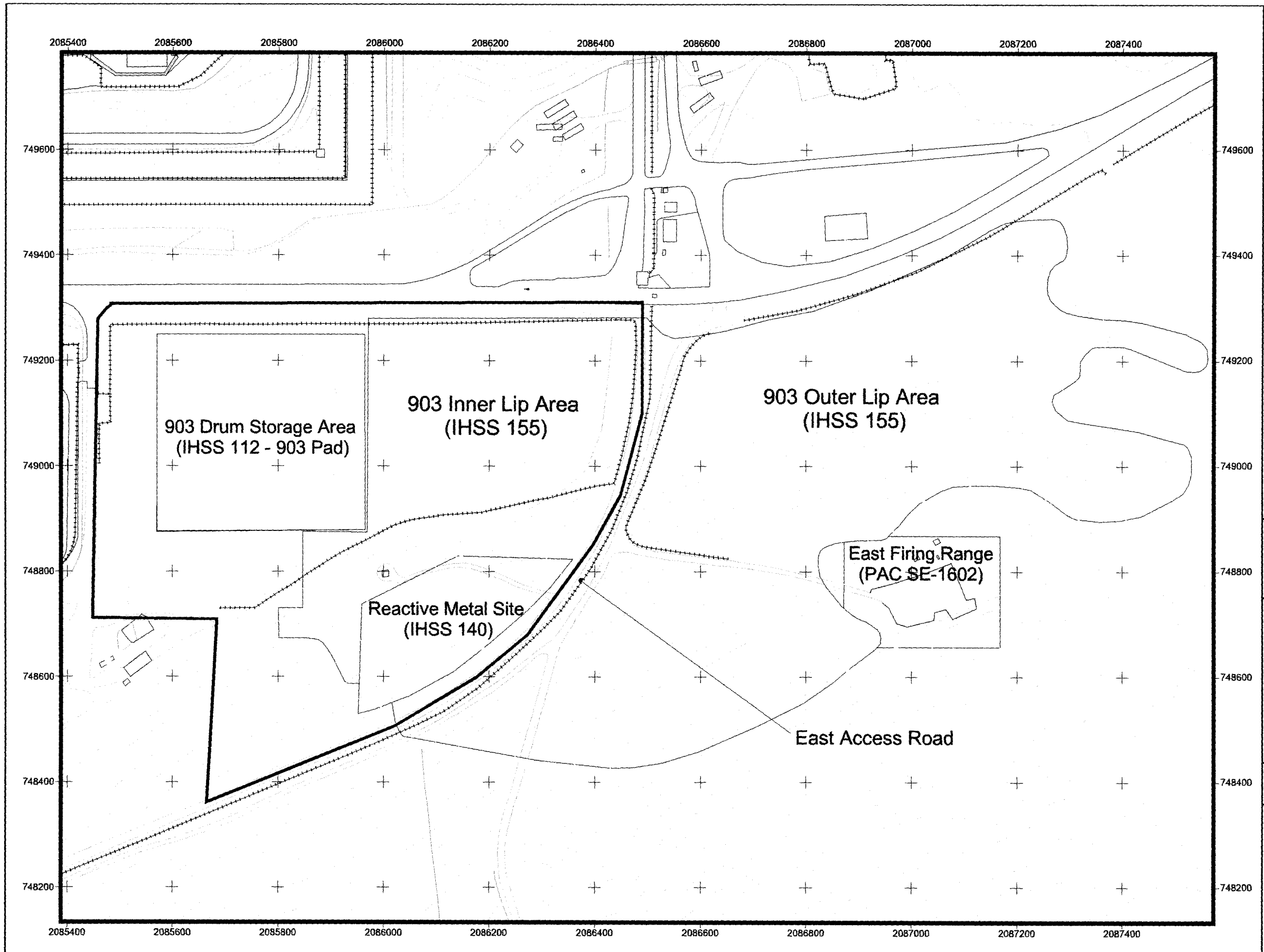
**Figure 1**
**IHSS Group 900-11**
**Individual Hazardous Substance Sites and Potential Areas of Concern**




Key

- IHSS
- PAC
- Building
- 903 Inner Lip Area
- 5-foot Contour
- Stream
- Paved Road
- Dirt Road
- Fence

N
W E
S

50 0 50 100 150 200 250 Feet

Scale = 1:2200

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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Prepared for: KAISER-HILL COMPANY

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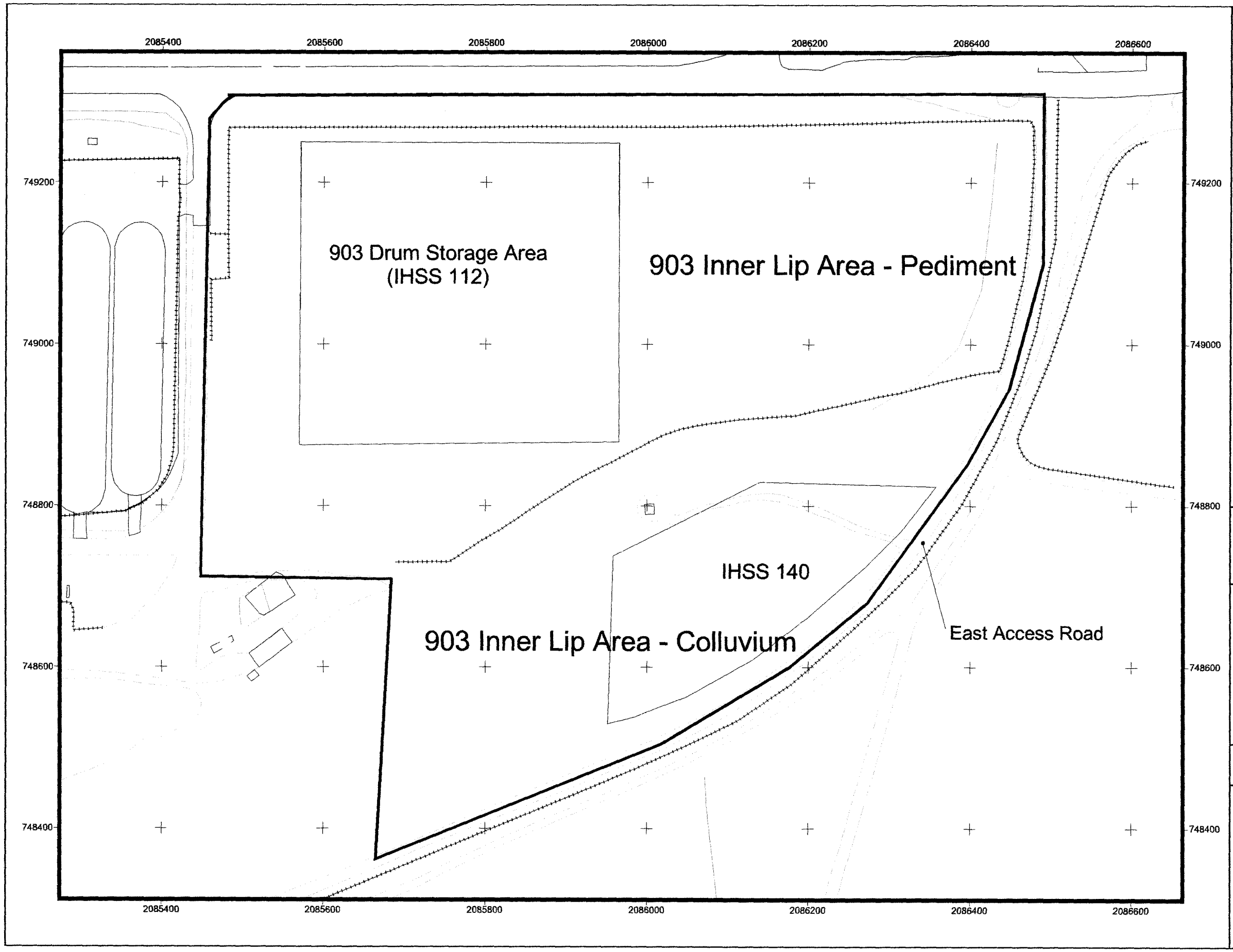


**Figure 2**
**903 Inner Lip Area**
**Pediment and Colluvium Areas**

Key

- IHSS
- 903 Inner Lip Area
- Contour 5ft
- Streams
- Paved Road
- Dirt Road
- Fence
- Building

N W E S

40 0 40 80 120 160 Feet

Scale = 1:1400

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
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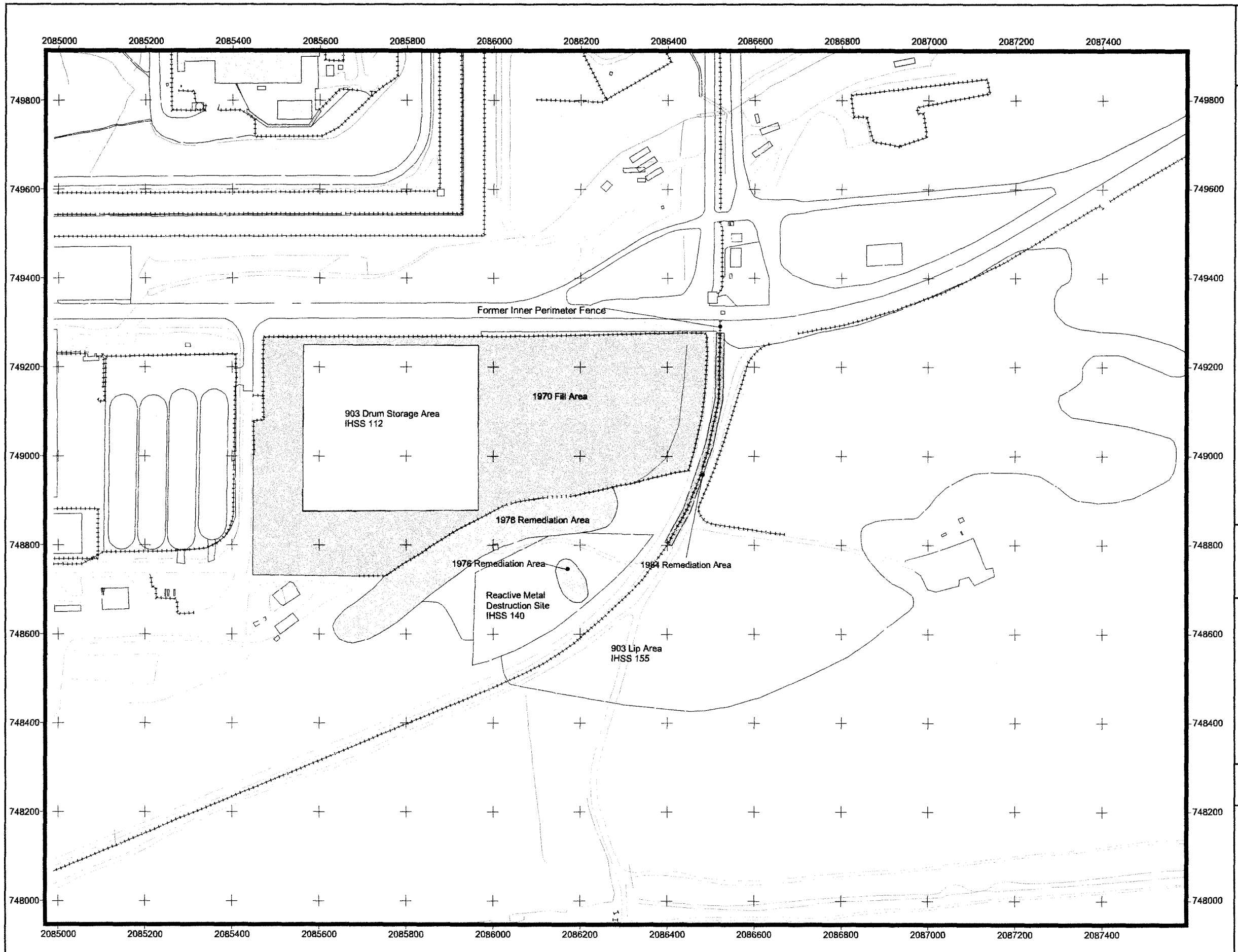


# Figure 3
# 903 Inner Lip Area
# Previous Remediation Areas

## Key

- IHSS
- 1984 Remediation Area
- 1970 Fill Area
- 1978 Remediation Area
- 1976 Remediation Area
- Building
- Stream
- Fence
- 5-foot Contour

N
W E
S

100 0 100 200 Feet

Scale = 1:2500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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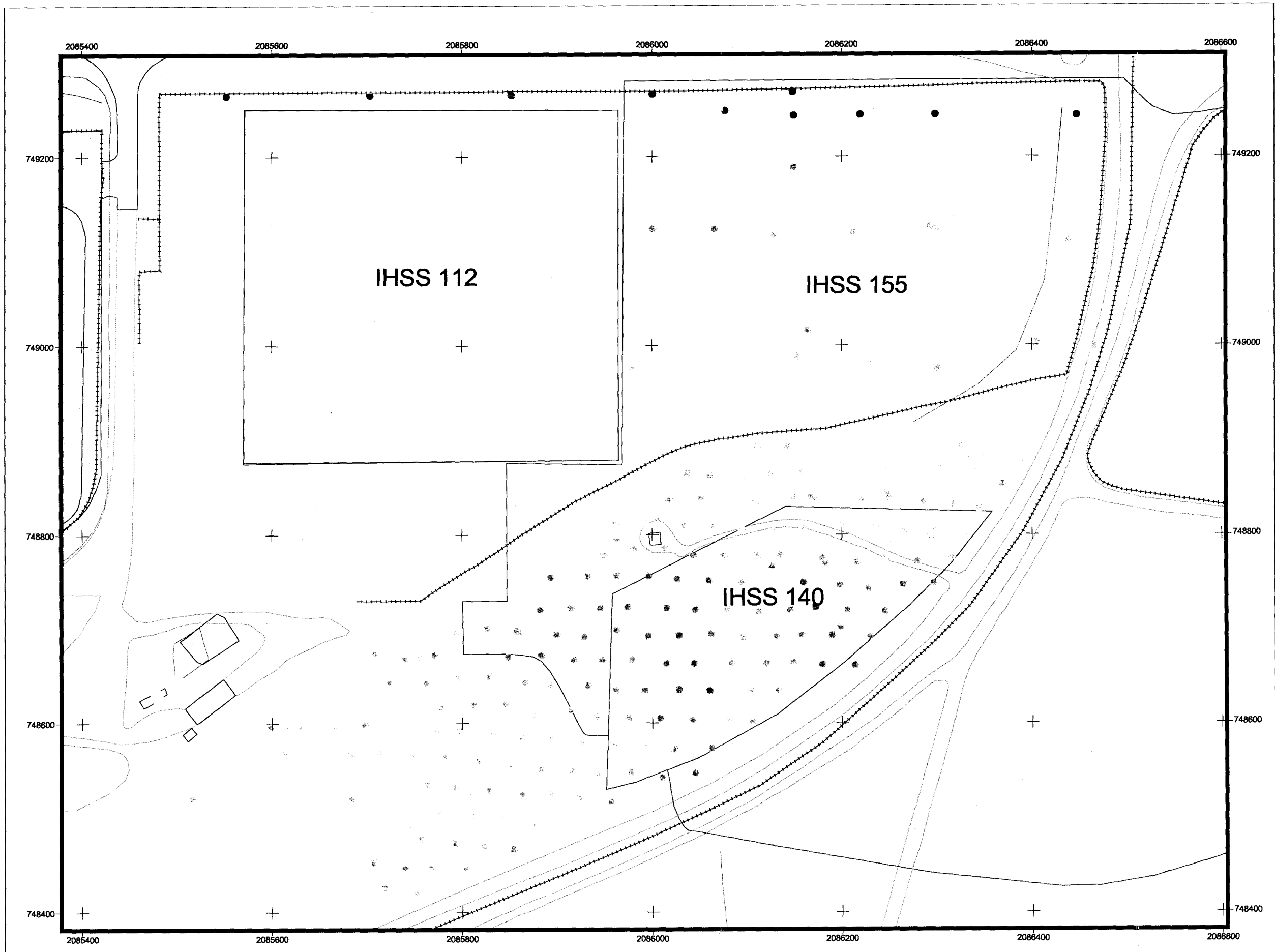


**Figure 4**
**903 Inner Lip Area**
**Surface Soil Locations**
**Where Radionuclides Exceed**
**Background Mean Plus**
**Two Standard Deviaitons**

Key

- Greater than Background
- Less than Background
- Stream
- Dirt Road
- Paved Road
- Fence
- IHSS
- Building

N
W E
S

50 0 50 100 150 Feet

Scale = 1:1500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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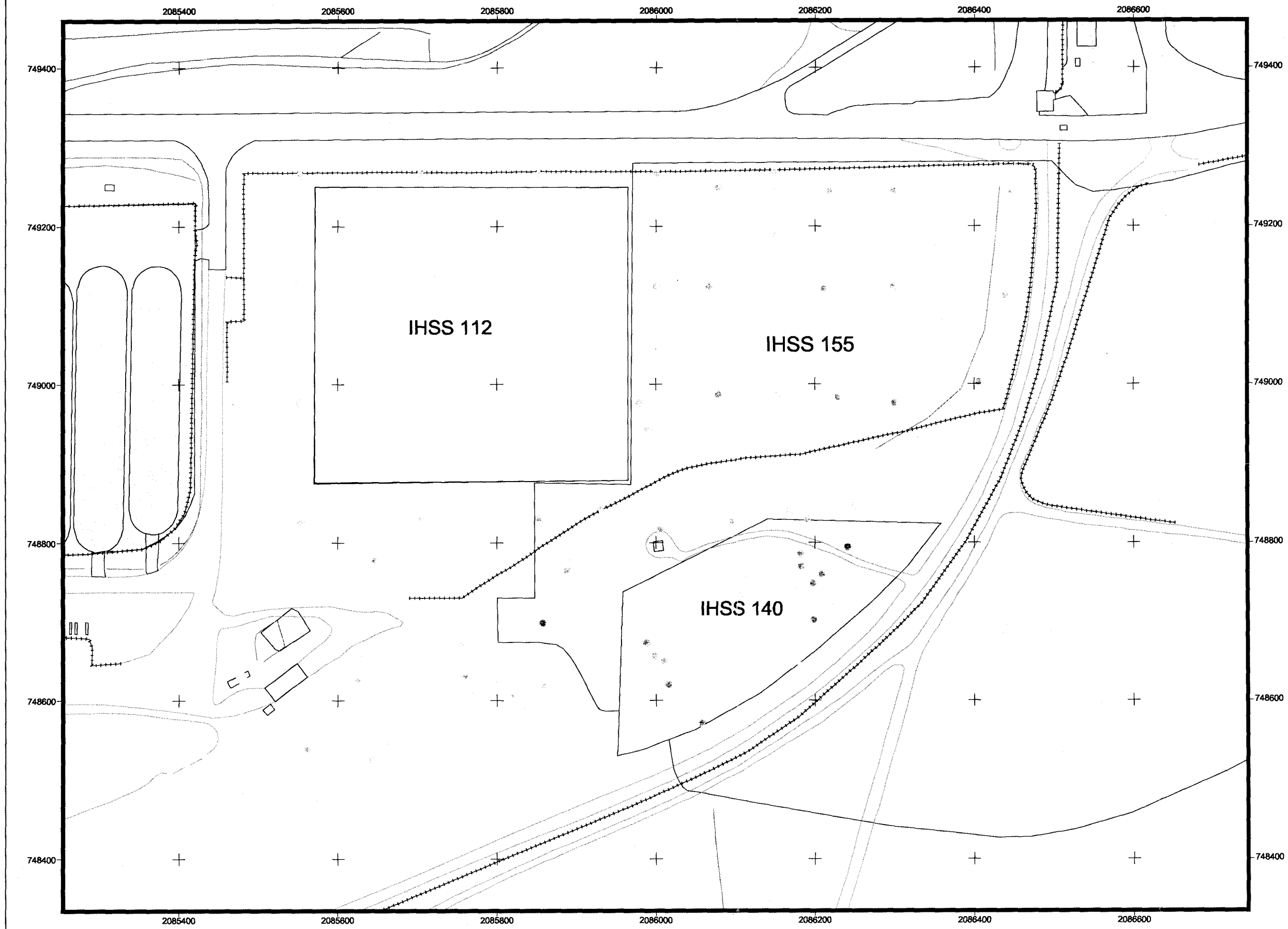
# Figure 5
# 903 Inner Lip Area
# Subsurface Soil Locations
# Where Radionuclides Exceed
# Background Mean Plus
# Two Standard Deviations




## Key

Greater than Background

Less than Background

Stream

Paved Road

Dirt Road

Fence

IHSS

Building

N
W E
S

40 0 40 80 120 160 Feet

Scale = 1:1500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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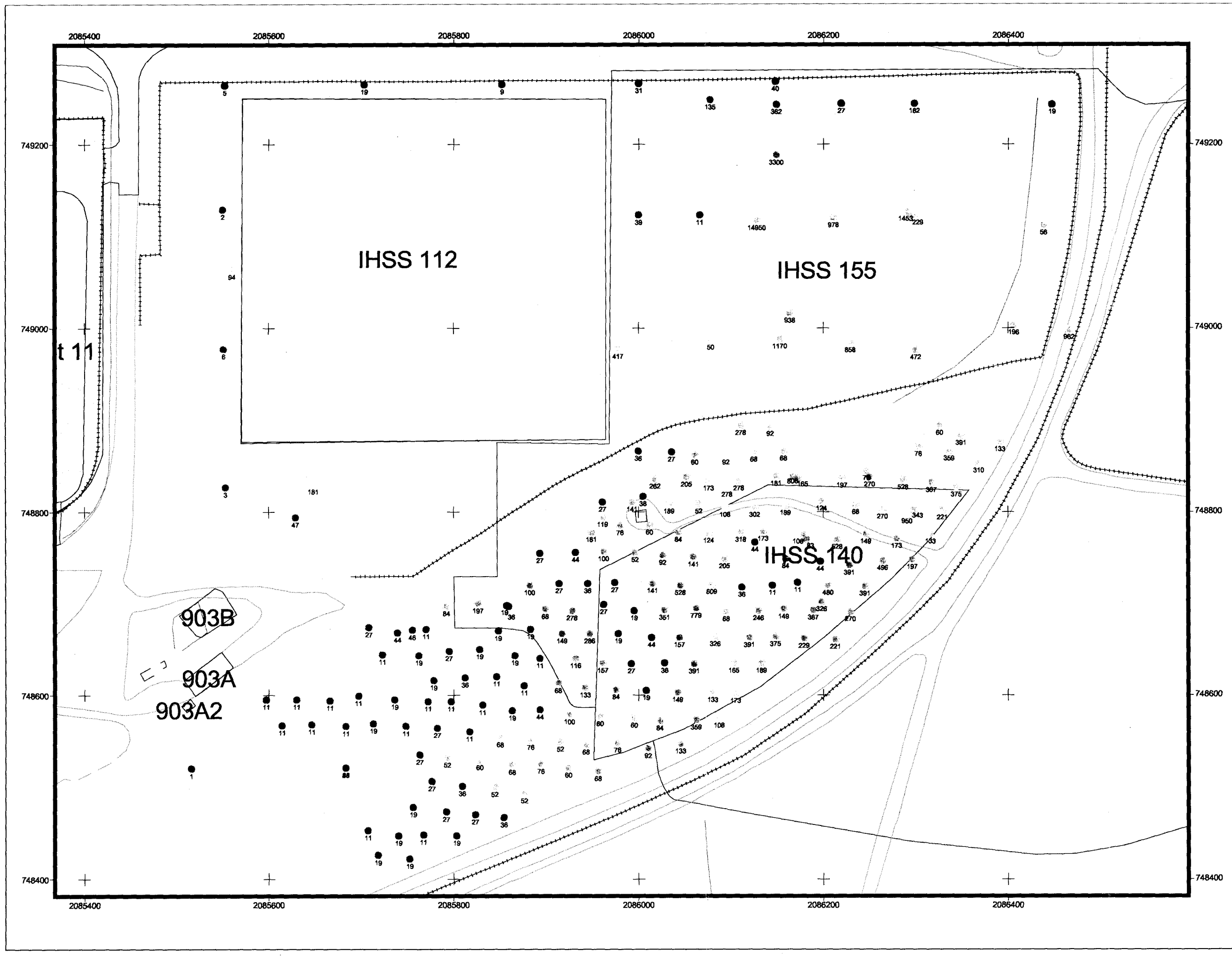


**Figure 6**
**903 Inner Lip Area**
**Surface Soil Locations**
**With Pu-239/240**
**Exceeding 50 pCi/g**

Key

- Surface Soil > 50 pCi/g
  55 Pu-239/240 Activity (pCi/g)
- Surface Soil < 50 pCi/g
  43 Pu-239/240 Activity (pCi/g)
- Stream
- Paved Road
- Dirt Road
- Fence
- IHSS
- Building

N W E S

40 0 40 80 120 160 Feet

Scale = 1:1500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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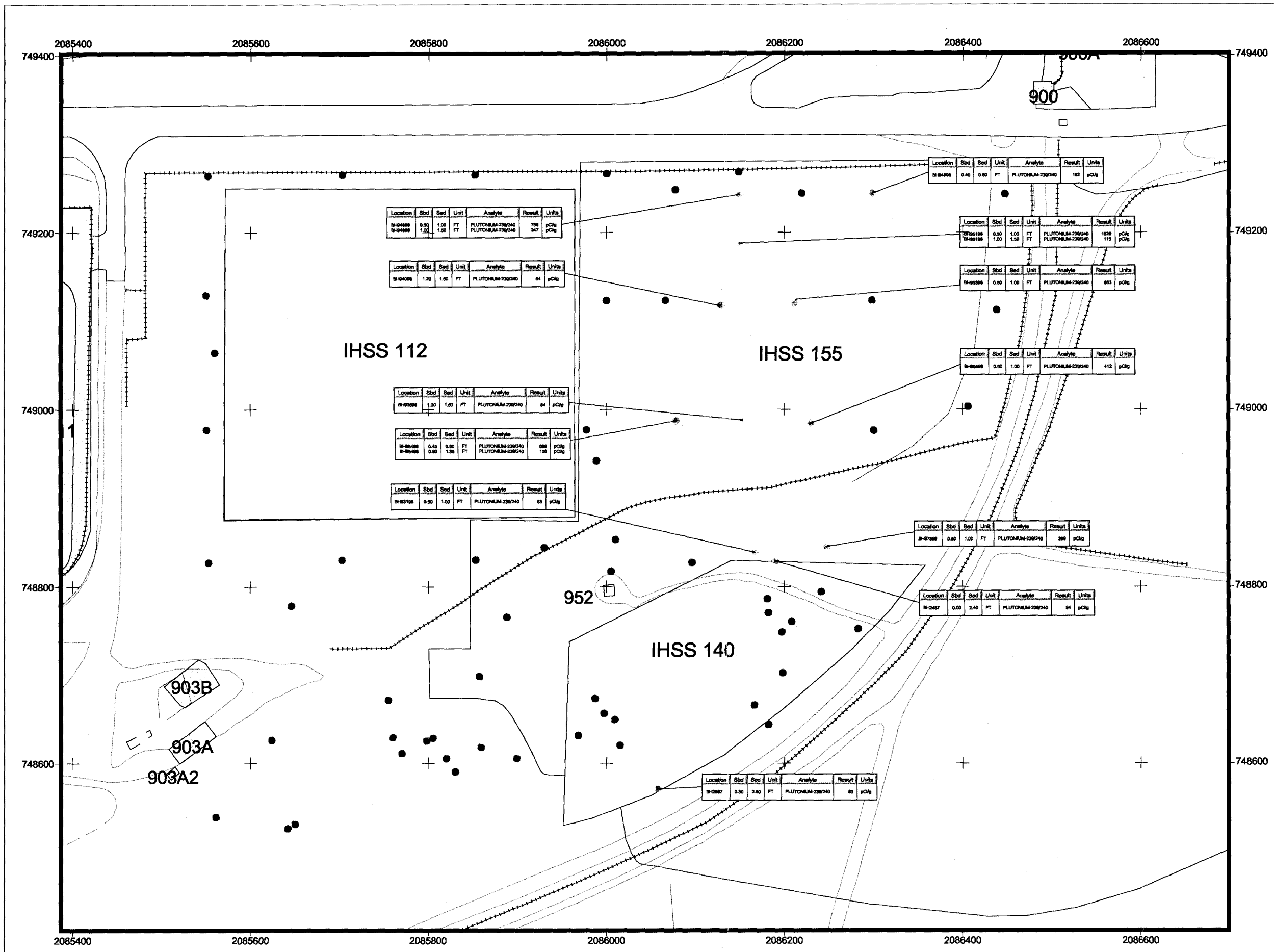
# Figure 7
# 903 Inner Lip Area
# Subsurface Soil Locations
# Plutonium-239/240 Exceeding 50 pCi/g




## Key

- Location Pu-239/240 >50 pCi/g
- Location Pu-239/240 < 50 pCi/g
- Streams
- Paved Road
- Dirt Road
- Fence
- IHSS
- Building

N
W E
S

40 0 40 80 120 160 Feet

Scale = 1:1200

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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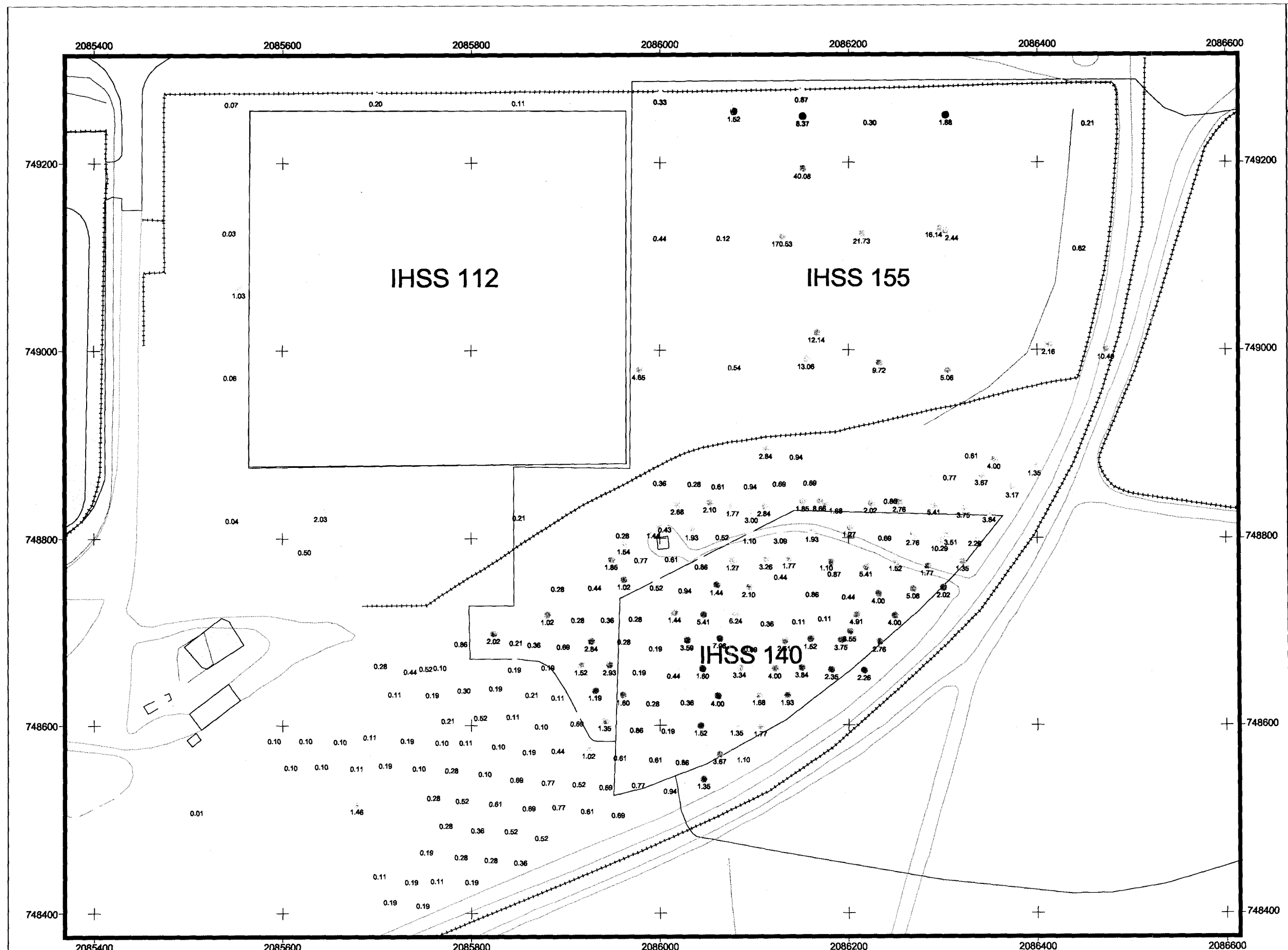


**Figure 8**
**903 Inner Lip Area**
**Surface Soil Locations**
**Where Sum of Ratios**
**Exceeds 1.0**

Key

10.05 Location with SOR > 1

0.53 Surface Soil Location

Stream

Paved Road

Fence

Dirt Road

IHSS

Building

Notes:
SOR = Sum of Ratios

N
W E
S

50 0 50 100 Feet

Scale = 1:1200

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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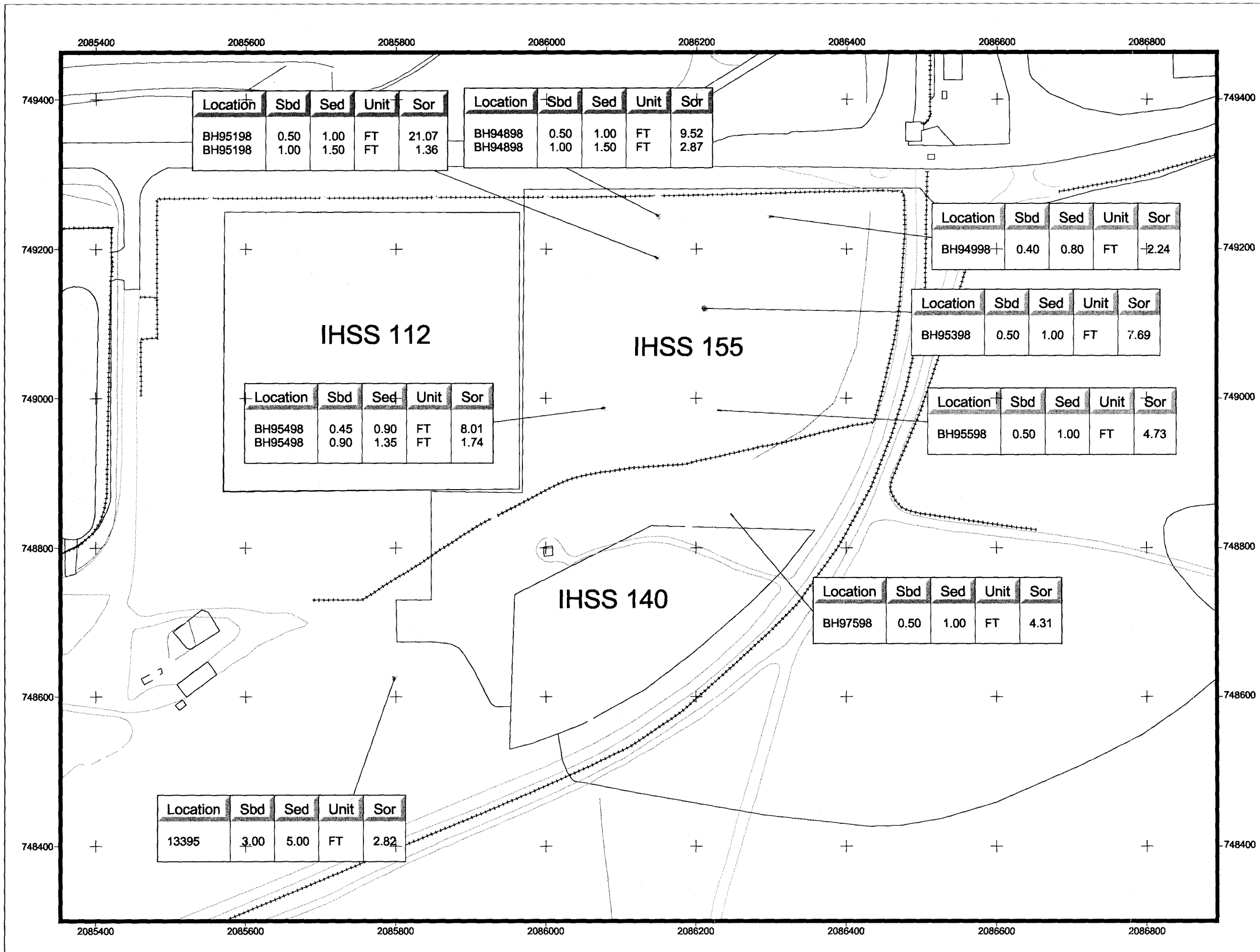
# Figure 9
# 903 Inner Lip Area
# Subsurface Soil Locations
# Where Sum of Ratios
# Exceeds 1.0




## Key

- Location with SOR > 1
- Location with SOR < 1
- IHSS
- Building
- Stream
- Dirt Road
- Paved Road
- Fence

Notes:
SOR = sum of ratios
Sbd = soil begin depth
Sed = soil end depth

N
W E
S

30 0 30 60 90 120 Feet

Scale = 1:1500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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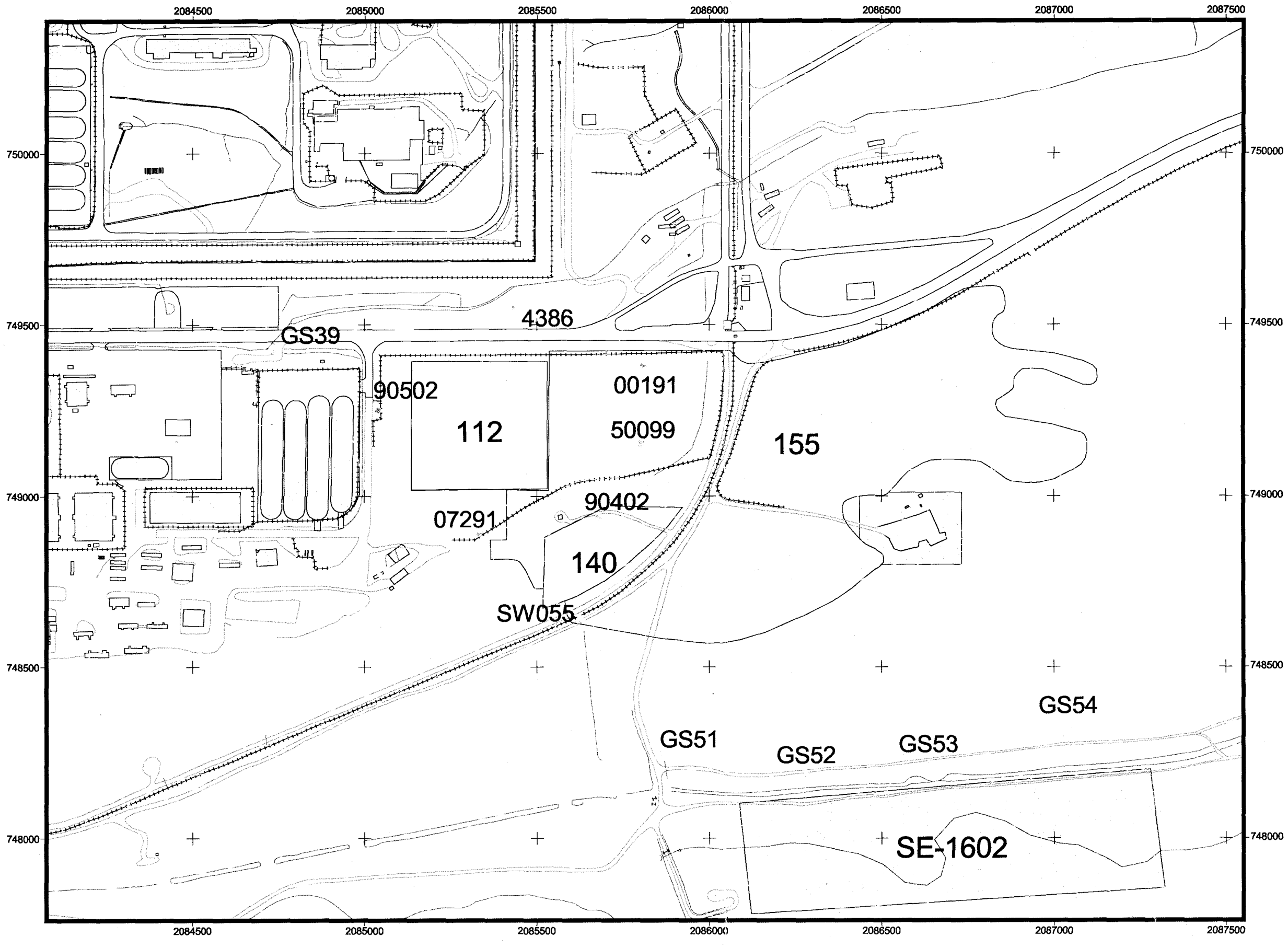


**Figure 10**
**903 Inner Lip Area**
**Groundwater and**
**Surface Water**
**Monitoring Locations**

Key

- Building
- IHSS
- PAC
- Groundwater Monitoring Location
- Surface Water Monitoring Location
- 5-foot Contour
- Stream
- Paved Road
- Dirt Road
- Fence

N
W E
S

100 0 100 200 300 400 Feet

Scale = 1:3500

State Plane Coordinate Projection
Colorado Central Zone
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